PESTS NOT KNOWN TO OCCUR IN THE UNITED STATES OR OF LIMITED DISTRIBUTION, NO. 16: VARROA MITE

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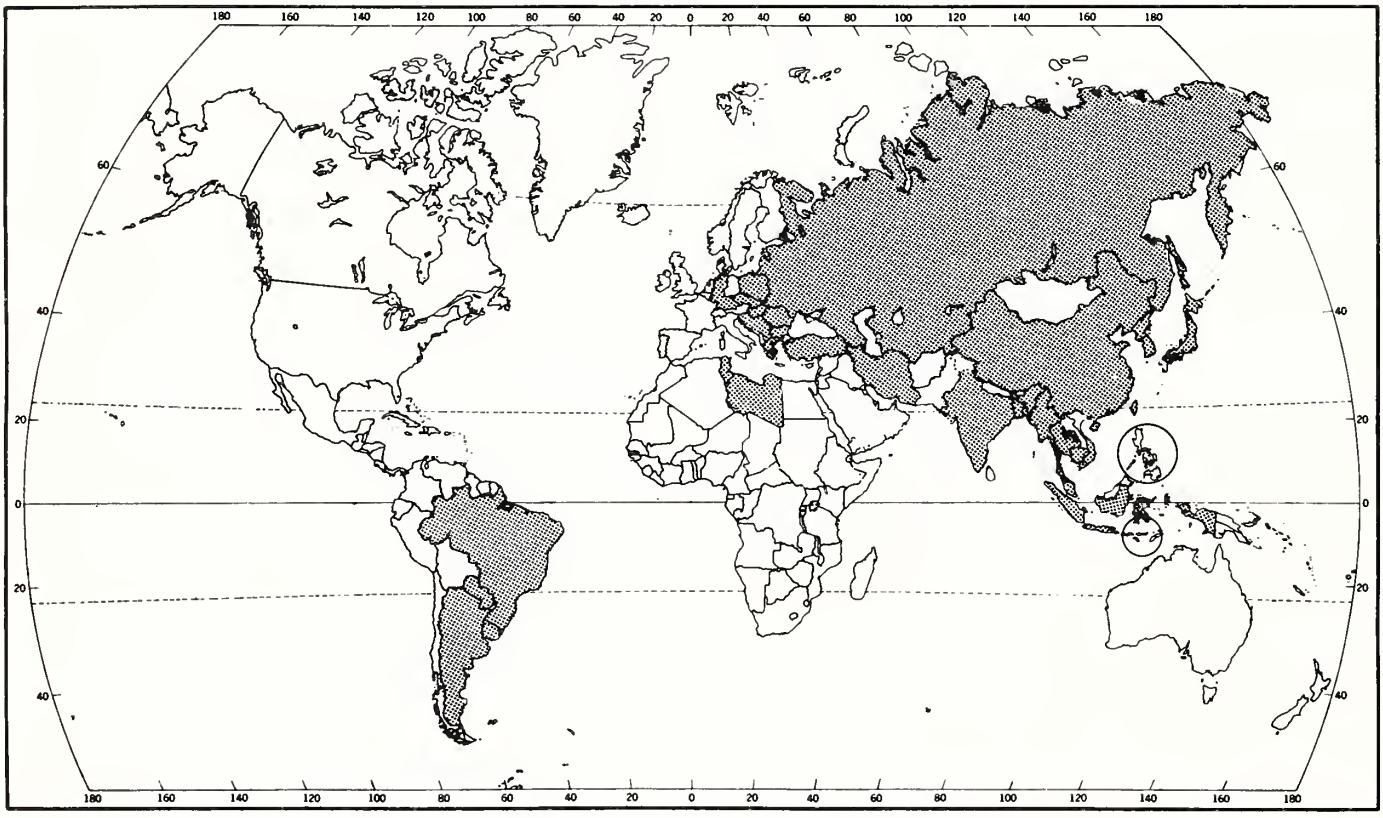
Order: Family	Parasitiformes: Varroidae
Class: Subclass	Arachnida: Acari
Pest	VARROA MITE *Varroa jacobsoni* Oudemans
Economic Importance	*Varroa jacobsoni* is an ectoparasite and is probably the most serious known pest of honey bee brood. The disease caused by this mite is called varroasis. Grobov (1977) reports that colony losses in apiaries initially are sporadic, but later 50-100 percent of the affected colonies are killed. This mite has never been controlled in any country.
Hosts	*Apis cerana* (a honey bee) and *Apis mellifera* (honey bee) are the only known hosts of *V. jacobsoni*.
General Distribution	*V. jacobsoni* was first reported on *Apis indica* (=*cerana*) from Java in 1904, and no reports of the mite appeared in literature until 1951, when the mite (as *Myromozercon reidi*) was found on *A. indica* in Singapore. The first report of *V. jacobsoni* attacking *A. mellifera* was in 1962-63 in Hong Kong and the Philippines (Oudemans 1904, Gunther 1951, Delfinado 1963). The following is the distribution for *V. jacobsoni*: Argentina (Montiel and Piola 1976), Bangladesh (Marin 1978), Brazil (Alves *et al.* 1978), Bulgaria (Velitchkov and Natchev 1973), Burma (Marin 1978), Cambodia (Ehara 1968), Peoples Republic of China (Ian Tzien-He 1965), Czechoslovakia (Samsinak and Haragsim 1972), Greece (Santas 1979), Hong Kong (Delfinado 1963), Hungary (Buza 1978), India (Phadke *et al.* 1966), Indonesia (Oudemans 1904), Iran (Crane 1979), Japan (Ehara 1968), Lebanon (Popa 1980), Libya (Crane 1979), North Korea (Tian Zai Soun 1967), Paraguay (Orosi-Pal 1975), Philippines (Delfinado 1963), Poland (Koivulehto 1976), Romania (Orosi-Pal 1976), Singapore (Gunther 1951), South Korea (Delfinado and Baker 1974), South Vietnam (Stephen 1968), Taiwan (Akratanakul and Burgett 1975), Thailand (Laigo and Morse 1969), Tunisia (Hicheri 1978), Turkey (Crane 1979), Uruguay (Grobov 1976), USSR (Breguetova 1953), West Germany (Ruttner 1977), and Yugoslavia (Santas 1979).

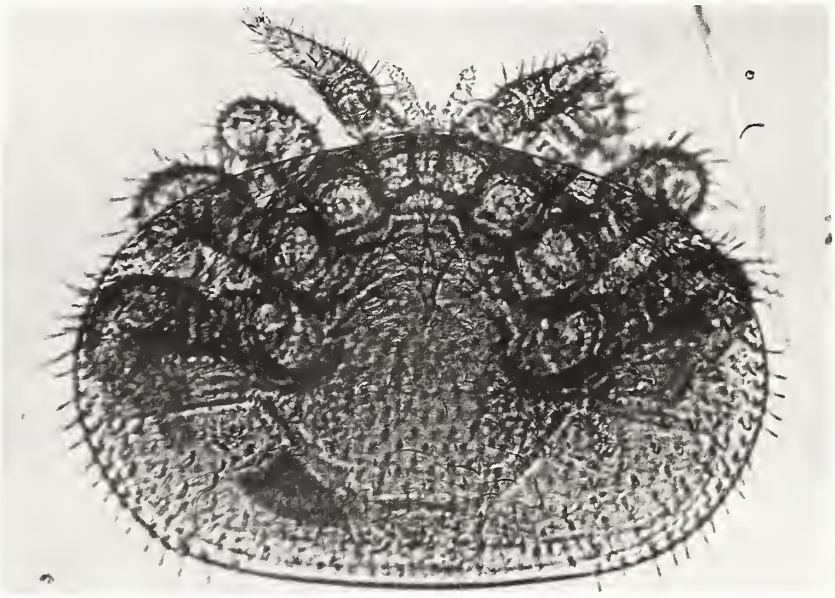


Varroa jacobsoni map prepared by USDA, APHIS, PPQ, Biological Assessment Support Staff

Characters

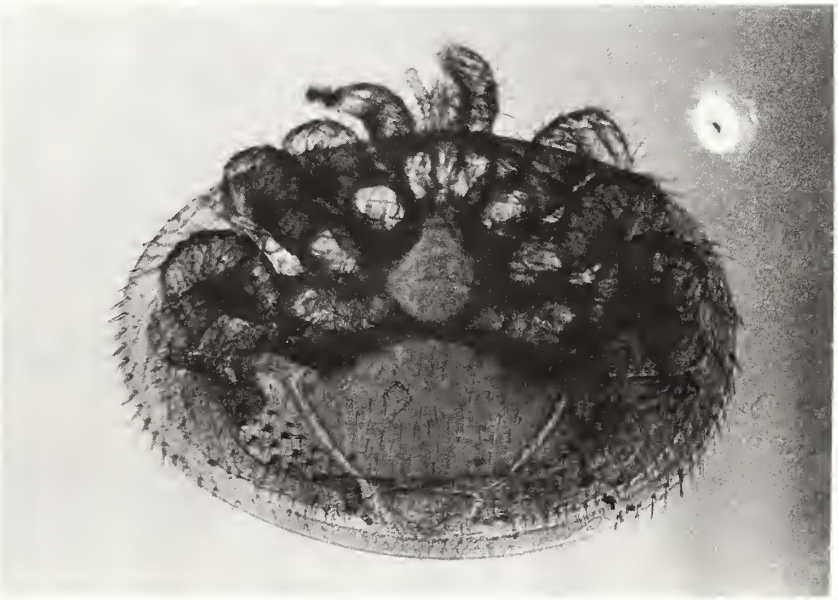
ADULTS - Females brown to dark brown, shaped like a crab, measuring 1.00-1.77 mm x 1.50-1.99 mm (fig. A and B). Only females are found on adult honey bees. Males yellowish and nearly round, measuring about 0.8-0.97 mm. Males are rarely encountered outside the honey bee brood cells.

(Fig. A)



V. jacobsoni: Female adult (dorsal view) (photo by D. A. Knox)

(Fig. B)



V. jacobsoni: Female adult (ventral view) (photo by D. A. Knox)

EGGS - 0.5 mm and white, usually found on the bottom or walls of the honey bee brood cell.

NYMPHS - V. jacobsoni has two nymphal stages, protonymph and deutonymph. Protonymphs of both sexes 0.7 x 0.7 mm. Deutonymphs differ in size; male 0.75 x 0.8 mm and female 1.0 x 1.3 mm. All nymphal stages (the destructive stage) white.

Characteristic Damage

The mites feed on the hemolymph of the developing honey bee brood. Heavily infested colonies show unusually large numbers of unsealed brood cells. At the entrances of affected colonies, dead or dying newly emerged bees are seen with malformed wings, legs, abdomens, and thoraxes. Sometimes even the apparently normal worker bees emerge smaller in size. Initial infestations may affect only 0.5 percent of the population and if left unchecked, more than 30 percent of the bees could be affected. Ultimately this leads to a decrease in population and could be reflected in a loss of honey crops and bees for pollination.

Detection Notes

1. In the initial phase of the infestation, all the brood in the colony should be examined by uncapping and removing the developing brood. As the mite population becomes established, honey bee colonies can be examined by the paper method. Attach a white sheet of paper or plastic on one side of a wooden frame, made with slats about 6 mm high and 13 mm wide. The frame should fit snugly on the bottom board of a hive. A hardware cloth, smaller than 8 mesh per 25.4 mm, should be stapled on the top surface of the frame. Then insert the entire unit into the hive. At weekly or monthly intervals the sheet should be removed and replaced with a new sheet. The old sheet should be taken to the laboratory and examined for the presence of mites. In addition, 100 or more brood cells should be examined for mites. Since the likelihood of the mites being present on drone brood is higher, concentrate on the capped drone brood.

   At the same time, approximately 500 nurse bees should be collected from the combs. This can best be done by collecting bees on combs with open brood cells. The bees should be taken into the laboratory and placed in a flask containing diesel fuel, kerosene, gasoline, alcohol, or hot water with detergent. Be sure there is enough fluid to completely immerse all the bees. Shake

the contents for 15-30 minutes on a shaker and filter first through a basket of 8 mesh per 25.4 mm or smaller to separate the bees from the liquid. Then filter again through several layers of cheesecloth. Finally, examine the cheesecloth for the presence of mites.

2. The extent of the infestation should be reported as the number of mites per 100 brood cells. For the filter method, report the finding as the number of mites per 500 bees. For the paper method, report the number of mites per colony.

3. Report the number of colonies sampled, the location of and the recent history of the hives. Information on where and when the colony was moved is especially important.

Biology

The biology of V. jacobsoni has not been thoroughly studied. Only the female mites are found on the adult honey bee. The mites can be found on the dorsal side of the thorax and abdomen of the bees. In addition, female mites can also be found in the intersegmental membranes of the abdomen on the ventral side of the bees. No harmful effects have been attributed to the mites on adult bees once they have emerged from the cells.

The female mite lays 1-38 eggs (average 7) in the cells of developing brood just prior to sealing. In 2 days, the protonymphs emerge and begin feeding on the larval hemolymph. The mites, as many as 20, attach themselves on the entire length of the larva. The entire life cycle, from egg to gravid female, lasts about 8-9 days, and mating occurs in the brood cell before the female emerges. The reproduction of mites is limited only by the availability of honey bee brood.

Natural Enemies

V. jacobsoni has no known enemies.

Controls

A number of fumigants have been tested against the mites (Grobov 1977). There is not one material that appears to be completely effective.

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